

METEOROLOGY, ETC., IN MAURITIUS

THE following letter from Mr. C. Meldrum, dated "Observatory, Mauritius, April 2," to a friend in England, gives some interesting data tending to prove a connection between solar activity and the state of the weather. With his new instruments we may hope soon to have some most important results.

"Since December last the colony has been suffering from drought, and there is very little appearance of a favourable change. February has been the driest month since systematic observation commenced in 1852, and the rainfall for January and March has been far below average. If the present state of things continue long, the island will be hard up for water.

"Coincident with this drought there has been, as usual on such occasions, a great falling off in the number and violence of cyclones in the Indian Ocean. We copy here the log-books of all vessels arriving in port from India, Australia, the Cape, England, &c., so that no great storm can take place over the greater part of the ocean without our getting more or less information about it. Well, the hurricane season is nearly over, and we have heard of only two storms, one on the 24th of January away to the northward of us, and one on the 7th of March, away to the eastward of us, and neither of them seems to have been extensive or very violent, only two vessels having been involved in each. The season thus bears a remarkable contrast to the corresponding periods for 1871, '72, and '73, and furnishes another instance of the now oft-observed fact that when Mauritius suffers from drought the Indian Ocean is almost free from hurricanes. The neighbouring island of Réunion has fared as badly as Mauritius, and the log-books furnish evidence that the drought has prevailed over a wide area.

"The S.E. trade-wind has been blowing from S.E. to E. and E.N.E. almost without interruption during the last three months, and the barometer been unusually high and steady for the season, thus showing that from some cause or other the belt of calms and variables between the S.E. trade and the N.W. monsoon has not advanced so far to the south as it did in the years 1871-74.

"It is only now that I am enabled to keep a continuous record of the sun-spots, the photo-heliograph having been put up a fortnight ago, and being at work only for a week; but from observations made directly, as often as possible, it would appear that there has been a great falling off in the number and magnitude of the spots. If this is the case, then we have, as on many other occasions, a decrease of spots, a decrease of cyclones, and a decrease of rain all at or about the same time.

"Our latest telegraphic news, *via* India, states that severe cold prevailed throughout Europe. It would be very interesting to know the conditions of weather for the whole habitable globe during the last three months. Comparative meteorology—including the sun's—can alone throw light on the nature of the relations subsisting between weather changes and variations of solar activity.

"Although the sun-spots decreased considerably in January and February, yet one or two pretty large ones appeared towards the end of February, and on the 27th of that month, between 1 and 7 P.M. we had (for this latitude) a remarkable magnetic storm. I fancy next mail will bring us news of auroras and magnetic storms having been observed in different parts of the world at that time. We had no aurora here, but on the 25th, 26th, 27th, and 28th there appeared, shortly after sunset, long beams of light radiating from a point near the horizon at E. by N. (nearly opposite the sun). This of course is easily explained without an aurora or any fitful outburst on the sun, but I have noticed that these radiating beams, which are sometimes very gorgeous, and occasionally radiate from points near the poles, are much more frequent in some years than others—which may arise from different states of the vapour and clouds. Dr. Lyall, who took a series of observations in Madagascar about forty-five years ago, makes mention of them, and describes them under the name of Aurora.

"We have all the instruments at work now, except the thermograph, which has not arrived. I have been so much occupied with the putting up of the instruments and removing into the new Observatory, that I have had very little time for anything else. I wished to send to the Royal Society some papers, but I could not manage to get sufficient leisure to prepare them. In a short time we shall be in train, and I hope to resume the subject of periodicities, &c."

SCIENTIFIC SERIALS

THE current number of the *Quarterly Journal of Microscopical Science* commences with an account by Mr. Wm. Archer of a new freshwater sarcodic organism, named by the author *Chlamydomyxa labyrinthuloides*, which is illustrated by a superb folio-sized coloured plate, as well as an octavo one. The species is shown to be closely allied to *Labyrinthula* of Cienkowski. The matrix is enclosed in a multilaminate cellulose envelope, which at times appears to burst and give exit to protoplasmic contents, which emerge in an arborescent manner with hyaline prolongations, along which small fusiform protoplasmic masses travel.—Rev. M. J. Berkeley gives a short account of the Thread Blight of Tea, in which he describes the fungus producing it, although he is unable to name it because he has not had an opportunity of examining the fructification.—Mr. P. Kidd draws attention to the occurrence of spontaneous movement in the nucleoli of the epithelium of the frog's mouth.—This paper is followed by an excellent and illustrated account of the structure of the Pacinian corpuscles, considered with reference to the homologies of the several parts composing them, by Mr. Edward Schäfer, in which it is shown—assuming an ordinary nerve fibre to consist of the axis cylinder in the middle, surrounded by, first, the medullary sheath, or white substance; secondly, a delicate layer of protoplasm containing nuclei; thirdly, the primitive sheath (of Schwann); and lastly, the numerous laminae of the neurilemma, which, however, encloses a layer of finely filamentous connective tissue—that the coats of the Pacinian are the layers of the neurilemma; that the sheath of Schwann surrounds the core, this latter being an expansion of the protoplasmic substance; that the medullary sheath, if not retained as such, disappears, and that the axis-cylinder becomes the central fibre.—Mr. A. W. Bennett gives an account of modern researches into the nature of yeast, specially noticing those of Reess and Cienkowski.—Prof. Lankester has a paper of special theoretical importance, on the Invaginate Planula, or Diploblastic Phase of *Poludina vivipara*; in which, after proposing the name "blastopore" for the orifice of invagination of those Planulae which exhibit it, he proposes a classification of Planulae, which helps to simplify this intricate part of embryonic history. He divides Planulae into two groups: *Delaminate* Planulae, in which there is no invagination, but a splitting of the blastosphere to form the endo- and ecto-derm; and *Invaginate* Planulae, which may be *embolic*, or have no food-yolk; or *epibolic*, possessing a "residual yolk." The Hydrozoa and Calcareous Sponges have delaminate planulae; Amphioxus, Ascidians, many Mollusca, Sagitta, Echinodermata, and many Vermes have embolic invaginate planulae; whilst in the third group are included many Mollusca, many Vertebrata, the Ctenophora, certain Vermes, and certain Arthropods.—Mr. H. C. Sorby describes the absorption spectrum of *Bonellia viridis*, and draws attention to a most striking point, namely, that there seems to be a constant ratio between the wave-lengths of the different bands in these spectra.—The number contains its usual excellent quarterly chronicle, notes, &c.

THE *Journal of the Chemical Society* (March 1875) contains the following papers, besides a large number of abstracts from other serials, already noticed in NATURE:—The formulæ of the alums, by S. Lupton. The author briefly states the formulæ given to the alums before they were finally designated as $A'B''2SO_4 \cdot 12H_2O$ (where A stands for an alkali metal and B for a metal of the iron group). At present some chemists use this formula, while others double it into $A_2'B_2''4SO_4 \cdot 24H_2O$. The cause of this variety of usage rests in the uncertainty attaching to the atomicity of aluminium; this metal appears as a tetrad when combined with chlorine, bromine and iodine, but as a triad in its methyl and ethyl compounds. The author tried to obtain certain bodies similar to the alums in constitution, but differing in the number of molecules of water which they contain; the latter have often served to establish the formula of salts. Experiments were made with iron and ammonium alum, aluminium and potassium alum, and aluminium and ammonium alum; these experiments are described, and the author arrives at the conclusion that the doubled formula as above is the correct one, as it seems that upon dehydration the residue $R_2R_2''4SO_4$ remains unaffected, and exists therefore in the ordinary alums in combination with 24 molecules of water.—On the colour of cupric chloride, by Walter Noel Hartley. This salt is almost invariably described as being of a green colour, but the author has found that the salt is only green as long as there is a trace of moisture about it; as soon as the salt is quite dry its crystals are

transparent, brilliant, and of a beautiful pale blue tint. A strong solution of the salt is deep green, a dilute solution blue. When the crystals are moist, they may be considered wetted with the dark green solution, and so their true colour is masked.—On the purification and boiling point of methyl-hexyl carbinol, by E. Neison.—This is followed by a note on the same subject from the pen of Prof. C. Schorlemmer. The two gentlemen agree pretty well with regard to the boiling point, which Mr. Neison finds to be at 181° – 182° C., and Prof. Schorlemmer at 179° ·5; the difference may probably rest upon the difference of thermometers.—The last paper is on the oxidation of the essential oils, by Chas. T. Kingzett.

Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie, Feb. 1.—Dr. Julius Ucke, of Samara, contributes an abstract of his work, undertaken chiefly from a medical point of view, on the quantitative proportions of atmospheric oxygen in different climates, in relation to temperature, moisture, and density of air. The public have chosen certain localities as health-resorts long before science pointed them out as eligible, and although we cannot doubt that oxygen is a great healing power in these, the part it really plays remains to be determined by physiologists and pathologists. The present work merely opens the way to inquiry, and does not claim to go beyond the evidence of statistics. Samara is a health-resort remarkable for the rarity of diseases of respiration, but its climate is windy and not mild, and the changes of temperature are great, both daily and seasonal. The conditions of temperature, moisture, pressure, and wind, do not account for its healthiness. Two factors remain: oxygen and ozone. Oxygen only concerns us at present. In order to find the relative quantity of oxygen at any place, thermometric, barometric, and hygrometric data are indispensable. Thirteen European and three Indian towns and one American station were chosen. Data for Nice, Algiers, and Madeira were wanting. Bearing in mind the hygienic object of his task, Dr. Ucke takes as a measure of the quantities of oxygen the number of inspirations of a grown man in the course of a month of 30·42 days. In the absence of a normal standard, the mean of the results for the seventeen stations is used for comparison. He finds that in the whole year most oxygen is inspired at Samara, least at Seringapatam; that, taking all stations, the quantities are largest in winter, least in summer, except at Seringapatam, where spring gives the lowest figure. Also, that generally the quantities decrease from E. to W. These differences of course depend on the three factors, temperature, density, and moisture. The first two have by far the most considerable effect. The article is illustrated by various tables.

The American Journal of Science and Arts, March.—The principal papers in this number are: On some phenomena of binocular vision, by Prof. J. Le Conte. The article has reference to the direction of the optic axes in sleep. Arguing from "double sight" in drowsiness, Prof. Le Conte concludes that the axes diverge.—The gigantic cephalopods of the North Atlantic, by A. E. Verrill. This is a continuation of a former article in which he records the dimensions of specimens captured within the last few years.—The trap rocks of the Connecticut Valley, by G. W. Hawes. This contains many analyses of dolerites and diabase.—On the comparison of certain theories of solar structure with observation, by Mr. S. P. Langley. (See following article.)—Notes on Costa Rica Geology, by W. M. Gabb. The area described—the district of Talamanca, consists of granite rocks on which rest beds of Miocene age, the granite being pushed up after the deposition of the Miocene.—Under the head of Scientific Intelligence is a description of a new order of Eocene Mammals, *Tillodontia*, by Prof. O. C. Marsh.—Report of progress of Geological Survey of Pennsylvania for 1874.—Notes on the transit of Venus.

Memorie della Societa degli Spettroscopisti Italiani, January 1875.—Mr. S. P. Langley, director of the Alleghany Observatory, contributes a paper on the comparison of certain theories of the structure of sun-spots with observation. He alludes to the so-called "crystalline" forms seen at times in the umbra of spots, and to their lending confirmation to the views of those who regard the photosphere as a luminous covering of incandescent fluid, and the spots cooling matter in it. The author says that they are at first sight so confirmatory of this view that it was only after long study he had been led to think them assimilable to certain cloud forms in our atmosphere. A beautifully executed steel engraving accompanies the paper, showing the forms alluded to over the umbra of a spot; and they certainly

put one in mind of certain forms of cirrus cloud. All the filaments of the penumbra are directed generally towards the centre of the spot; but while all are more or less curved, there is no common direction of curvature. Mr. Langley also remarks that the ends of the filaments are generally the brightest parts, and that it is difficult to resist the impression that they turn upwards at the extremities and appear as though lifting their points through some obscuring medium. One of the crystalline forms appears in great beauty on the spot. It is about 20" long, and 10" wide, and has the appearance of a plume or of finely carded wool: and the author asks if we are prepared to admit the existence of a body analogous to a crystal covering ten times the area of Europe. He also refers to sudden and abrupt changes in the direction of the filaments, apparently being due to the passage of one cloud stratum over another, and he remarks this disposition elsewhere in the spot giving a terraced appearance. He says: "It seems difficult to reconcile the bright, sharply-defined inner edge and the regular structure discerned in the umbra, with another view in which this umbra is a sort of stagnant pool formed by cold vapours or clouds which have settled there after depressing the general surface by their weight until the penumbral slope is determined;" and "The theory which regards cyclonic or vertical action as a prominent agent in determining the forms we have studied appears to be in closer accordance with observation than the former."—Father Secchi, in a note on the foregoing paper, remarks that at the edge of the sun, where the spot in question disappeared, there was seen an active prominence, and his further remarks are to be continued in the next number.—P. Tacchini contributes a paper on the condition of Italian and other observatories, giving the staff at each and their salaries. We extract the total payments to the staff and for instruments at the following Observatories:—

	Lire.		Lire.
Paris	54,000	Rome	4,920
Greenwich	75,000	Padua	6,200
Pulkowa	220,000	Modena	4,940
Palermo	7,800	Turin	4,700
Naples	13,248	Bologna	4,500
Florence	6,700	Parma	1,300
Milan	14,802		

SOCIETIES AND ACADEMIES

LONDON

Royal Society, April 15.—"Researches upon the Specific Volumes of Liquids," by T. E. Thorpe. Communicated by Prof. Williamson, For. Sec. R.S.

I. On the Atomic Value of Phosphorus.

Hermann Kopp has shown that, as a rule, the specific volume of an element is invariable when in combination. Exceptions to the law occur, however, in the cases of oxygen and sulphur, each of which bodies has two specific volumes dependent upon the manner in which they are held in union. When contained "within the radicle," as in acetyl, C_2H_3O , oxygen has the value 12·2, but when existing "within the radicle," as in alcohol, it has the smaller value, 7·8. Sulphur, when "within the radicle," has the specific volume 28·6; when "without the radicle," it has the specific volume 22·6.

The cause of these variations may be thus stated in the language of modern theory:—When dyad sulphur and oxygen are united to an element by both their affinities, their specific volumes becomes respectively 28·6 and 12·2; when they are attached by only one combining unit, their specific volumes are 22·6 and 7·8.

Phosphorus is regarded by certain chemists as invariably a triad; others maintain that it is sometimes a triad, at other times a pentad. In the trichloride it is a triad, in the oxychloride and thiochloride it is a pentad. According to this view the two latter compounds possess the following constitution:—



If, however, phosphorus is invariably trivalent, the oxychloride